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Identification of important Landscape areas in Palestine: The case of Battir area

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Abstract
Cultural and natural landscape areas represent a chronologically combined effect of nature-man interaction. To identify such interactions, a study aimed at exploring important natural and physical environmental settings (geology, topography, geomorphology, land uses, climate, etc.). The study focused on Battir landscape area in Bethlehem District. The study also aimed at identifying the landscape changes and its driving forces. Field trips and observation, maps and map analysis by Geographic Information system (GIS), and questionnaires were utilized to explore different cultural and natural landscape elements and its properties, aiming at studying potential of the study area and possibility to qualify it as an important landscape. Amongst important landscape elements that were taken into consideration are topography, biodiversity, geology, water resources, land uses, and aesthetic factors of the area. According to the analysis of the study area, results showed that the western and northern parts have the highest total positive ranking in terms of landscape attractors. Generally speaking, both parts (western and northern) have acquires high importance because of the diversity of existing natural habitat, the presence of historical, and cultural symbols, the high aesthetic values, the presence of traditional and historical land use characteristics, the prevailing water structures, water distribution, terraces and water delivery systems that constitute important part of the history and tradition that was and still in use. This means that these parts are the most valuable parts of the landscape that should be included in any future conservation and protection efforts.

Keywords: Cultural landscape, natural settings, objectives, subjective, Battir, Bethlehem, landscape quality, landscape attractors, landscape detractors.

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تحديد مناطق المشاهد الطبيعية الهامة في فلسطين:

منطقة بتير كحالة دراسية

ملخـــــــص

تمثل مناطق المناظر الطبيعية الثقافية والطبيعية التأثير الزمني للتفاعل ما بين الانسان والطبيعة. للتعرف على هذه التفاعلات، هدفت الدراسة إلى استكشاف مواضع هامة للمشاهد الطبيعية حسب الخصائص المادية والبيئية (الجيولوجيا والطبوغرافيا، الجيومورفولوجيا، واستخدامات الأراضي، والمناخ، الخ) . وركزت الدراسة على قرية بتير ومحيطها والموجودة في محافظة بيت لحم .وهدفت الدراسة أيضا إلى تحديد التغيرات في المشهد الطبيعي والعوامل المحركة لهذه التغيرات .ولتحقيق الأهداف السابقة، فقد استخدمت الرحلات الميدانية والملاحظة الميدانية والخرائط وتحليل الخرائط من قبل نظام المعلومات الجغرافية (GIS)، والاستبيانات لاستكشاف مختلف عناصر المشهد الثقافي والطبيعي وخصائصه، وذلك بهدف تحديد إمكانية اعلان منطقة الدراسة كمنطقة مهمة من ناحية المشهد الطبيعي والثقافي. وقد كان من ضمن عناصر المشهد التي تم أخذها بعين الاعتبار التضاريس والتنوع الحيوي والجيولوجيا والموارد المائية، واستخدامات الأراضي، والعوامل الجمالية للمنطقة.

أظهرت النتائج أن الأجزاء الغربية والشمالية لها أعلى وزن إيجابي من حيث عناصر الجذب. وبشكل عام، فقد امتلك كلا الجزئين في المشهد (الغربي والشمالي) أهمية كبيرة نظرا لتنوع الموائل الطبيعية الموجودة، وجود العناصر التاريخية والرموز الثقافية، والقيم الجمالية العالية، وجود استخدامات الأراضي التقليدية والتاريخية، ووجود المنشآت المائية والطرق التقليدية لتوزيع المياه، اضافة الى المصاطب الزراعية ونظم توزيع المياه التي تشكل جزءا مهما من التاريخ والتقاليد التي كانت وما زالت قيد الاستخدام. إن هذا يعني أن هذه الأجزاء هي الأكثر قيمة من المشهد والتي ينبغي إدراجها في أي جهود للحفاظ عليها وحمايتها في المستقبل.

1. INTRODUCTION

Cultural landscape is "a geographic defined area that is enclosing both cultural and natural resources, in addition to the presence of historical event/s, activity/ies, or person/s, and/or exhibiting important cultural character/s and/or aesthetic values." (Jewell & McKinnon, 2008).

The cultural landscape is differentiated from a natural landscape by a cultural group that shape out important characters of the landscape, especially those related to the land use types and patterns, as well as the human-related cutural propoerties of the landscape. As a consequent, the exisitng culture of the inhabitants is considered as the agent of the landscape, the natural constituents of the landscape is the medium, and though the cultural landscape is considered as the result of the interaction of both factors: culture and natural (Jones, 2003). In other words, cultural landscape is considered as a reflection of the exisiting culture of one or more socity textured into the exisitng natural elements of an area (i.e. topography, natural vegetation, geology, etc.).

Many researchers considered Battir as a typical area that resembles the past interaction between man in its culture and existing natural resources. This interaction is shaped out through the intensive agricultural system (i.e. terraces, irrigation canals and the old irrigation system, the many archeological and historical places, and the legend beyond these places, etc.). In addition to the human-nature interactions, Battir acquired scenic characteristics with regard to topography, location, and the aesthetic values of the landscape. All of these special characters could be important evidences that qualify this area for protection through sound, balanced, and sustainable management practices that could keep the area intact with minimum changes in its elements for the future generation as well as for the culture of the world.

The objective of this paper to explore the existing potential of Battir area, which is related to past culture, its relation to existing elements of the area (both the human and

the natural), and in turn the value that these elements constitute to the regional as well as the international cultural and natural importance.

2. MATERIALS AND METHOD

2.1. SELECTION OF THE STUDY AREA

Battir area was chosen because it is consistence with the following roles (Al- Dabbagh, 2002; Carroll, 1923; Lieut & Conder, 1881):

- Connection of the area with the World Heritage proposed exceptional area.
- Has a high degree of threats that are resulting from random urban expansion, occupation influences, and other human activities.
- High value and exceptional type of natural landscape, which is represented by the following characteristics:

  a. Agricultural diversification, especially the presence of vineyards and olive groves plantation.
  b. Cultural diversification, especially those constructions that are related to the cultural and historical places connected to the agronomic use of the area (i.e. old vineyards' and olives press, old terraces, etc.).
  c. Potential for future development and tourism attraction.

- The state and type of reaction between man and nature, which can produce a certain positive characters (i.e. multiple cropping, terraces, water harvesting techniques, etc.)

2.2. MAPPING THE STUDY AREA

Base maps of the area were computerized. The base maps have a scale of 1:20,000 dated to the 1933 of the British Mandate period. The basic data that were introduced into the base map are the following:

1. The surface watershed boundary in accordance to the contour lines and the meander of the valleys' network.
2. The contour elevation lines, which resembles 20 meter intervals
3. The 1933 land use of the area, which contains the following features:
   - Location, concentration and direction of the built-up area in Battir village.
   - Road network.
   - Different agricultural areas, including different cropping patterns, as well as the forested areas.
4. Different historical and natural settings of the area, such as historical places, water resources especially valleys and springs.
5. Soil and geological data were computerized from auxiliary sources. In this regard, the soil and geology were extracted from large-scale maps (1:250,000), hence, it is only providing a general description of the area.

2.3. THE QUESTIONNAIRE

The questionnaire was designed to provide data on the existing natural and cultural settings of the study area. The questionnaire was divided into six main parts, these are:

1. General information (Geography, location, names, etc.)
2. The natural landscape characteristics: which includes the following elements:
    - Topography.
    - Areas of biodiversity.
    - Geology and geomorphology.
    - Surface and ground water.
    - Aesthetic factors.
    - Existing land use.
3. Cultural landscape elements.
4. Types and components of the cultural landscape.
5. Dating of the cultural landscape.
6. Type and status of the existing threats to the landscape.

For each part of the questionnaire, different questions were designed so as to get accurate data, either from literature, field survey, or from the inhabitants of the area.

A pre-test of the questionnaire was carried out through filling by key persons in the study area. As a result some questions were adjusted accordingly and some other was canceled. Each part of the questionnaire was evaluated by specialized persons and then either approved or modified according to the evaluation.

2.4. SELECTION OF THE LANDSCAPE ELEMENTS

Landscape elements are the basic input material from which the functional and visual value of the landscape is estimated. In this regard, it is necessary to identify the natural (physical) and cultural elements of the landscape, which enables the evaluation of the landscape importance and value from a conservational point of view.

2.4.1. NATURAL ELEMENTS

Natural elements of the landscape are related to the physical elements in the area. The natural elements that have been taken into consideration for the purpose of the landscape study are the following:

- Topography of the study area: this includes the type of topography (i.e. valleys, plains, etc.), local name/s of these features, the shape of different topographic sections and their steepness.
- Area of biodiversity, including natural flora and fauna.
- Geology: in some areas, geological formations are of major importance and connected to the existing soil type and land use. In addition, the associated geological feature such as folds and faults are the major factors for the formation of different topographic elements (i.e. hills, valleys, coasts and plains).
- Major soil types existing in the study area.
- Surface water resources, including number, type, and local names of different surface water resources.
- Ground water resources and ground water recharge areas.
- Aesthetic factors: this is related to the texture and element of beauty in the landscape. Aesthetic factors included the following elements (Ministry of Planning and International Cooperation -MOPIC, 1999; Ministry of Planning and International Cooperation -MOPIC, 1999):

- Color of the landscape as a whole.
- Diversity of different elements that is included into the landscape.
- Unity of the landscape as one major visible unit or divided into different discrete subunits.
- Form of the landscape, whether angular, straight, curved or sinuous.

- Other significant factors: these are related to the land use features, which are either in harmony (i.e. arable lands and forested areas) or oppose (quarries, stone cutting and crushing facilities, built-up area, and road networks) the general contextual pattern of the landscape.

2.4.2. CULTURAL ELEMENTS

Within the limited watershed area of Battir, one can find several archeological, historical and cultural sites of interest. Amongst the most important ones are the following sites (Carroll, 1923; Jewell & McKinnon, 2008):

1. Khirbet al Yahud: it is a Roman site in which one can find a castle surrounded by protective walls.
2. Khirbet Karzalah: this site has a Roman and a Mamluk Muslim archeological remains.
3. The Eastern khirbeh: located in the eastern part of Battir. The site has many caves, tombs and walls belonging to Canaanite period. Later on its name has been modified to Betar.
4. Al 'Omari Mosque.
5. Maqam as Sheik Zeid.
6. Springs and the associated water collection and distribution systems in the area. This is because most of these constructions, although recently rehabilitated, belong to ancient times (i.e. Roman and Islamic periods).

The analysis of the historical and archeological components and their values in the study area will though be based on the number and historical importance of each site. In addition, aesthetic as well as current values and uses of such historical features will also be taken into account in the analysis of the cultural landscape study.

3. RSULTS AND DISCUSSION

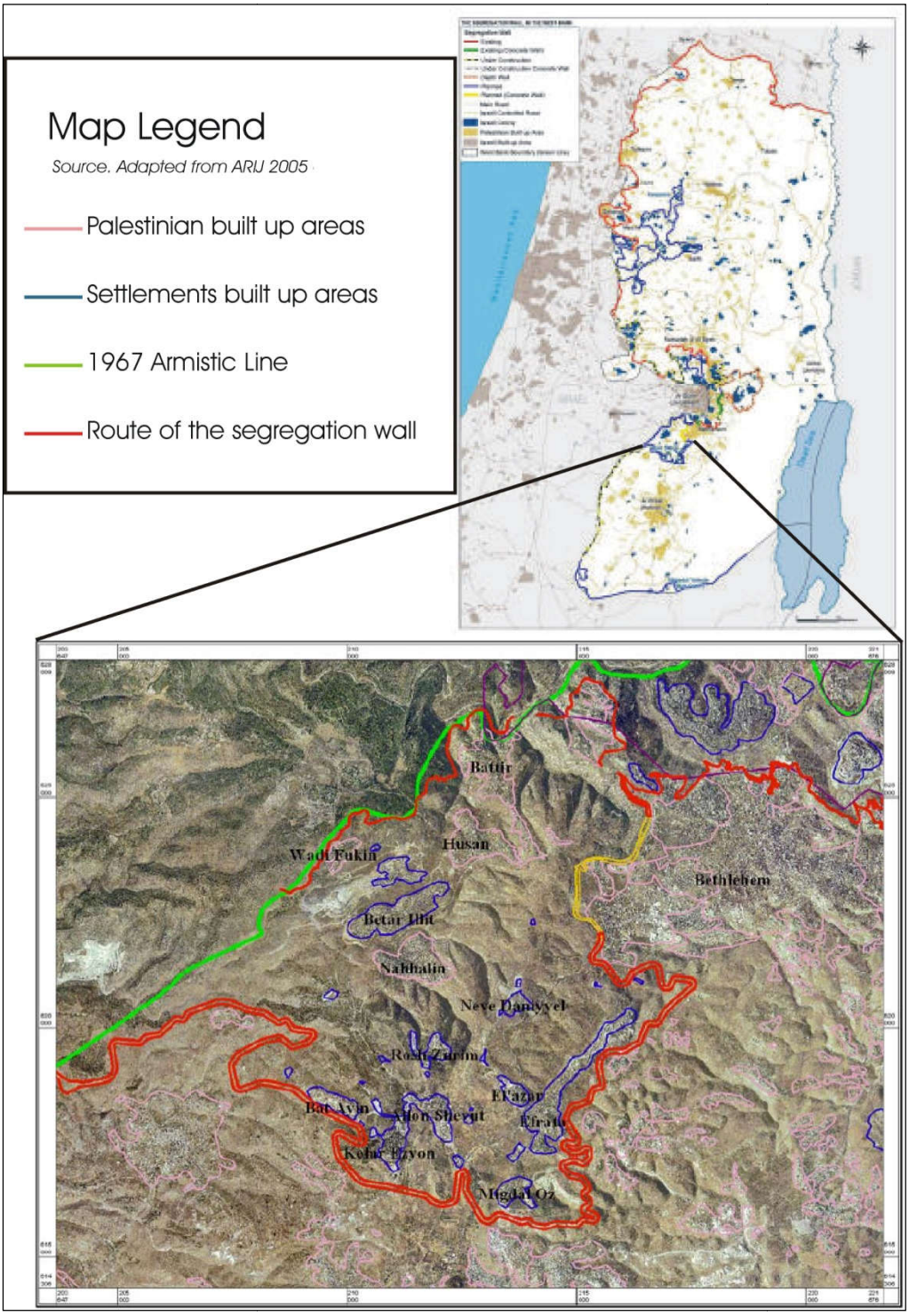
3.1. NATURAL SETTINNGS

3.1.1. Landscape physical and natural settings

Location, geomorphologic, demographic and hydrologic settings

Battir is a village situated in Bethlehem Governorate. The village is located about 10 km west of Bethlehem city and about 7 km southwest of Jerusalem (Map 1).
The village is located on a sloppy mountainous area that descends steeply towards what's called Battir Valley to the north of the village. Moving from the southern part to the northern part of the village, the elevation drops sharply from about 850 m a.s.l to

about 600 m a.s.l. nearby Battir valley entrance. Due to this steep slope from the south to the north, it has become a necessity to build stonewall terraces to prevent extensive soil erosion, in addition to conserve soil-moisture and provide more suitable land for cultivation, though numerous stonewall terraces are distinctive in the area of Battir (Picture 1).



Map 1: Location of Battir area (macro and micro location), the surrounding villages, and the nearby Israeli Settlements.

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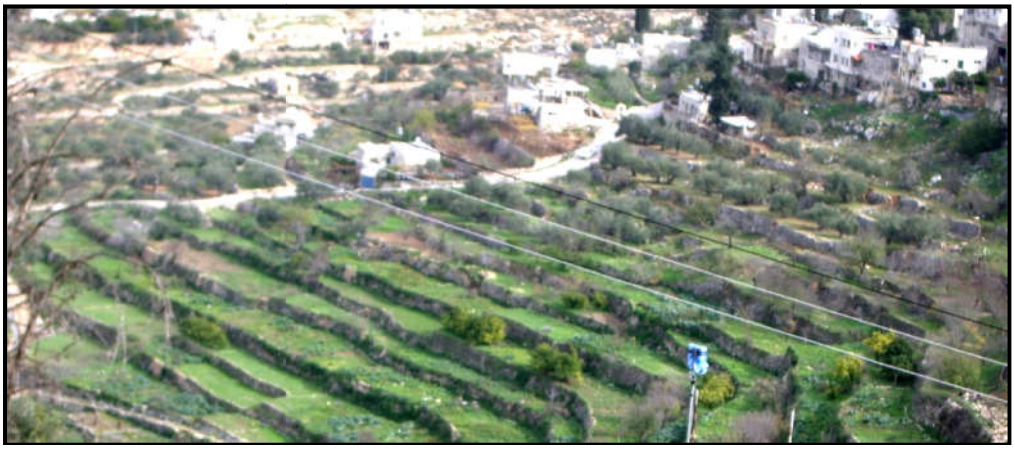
From a geographic point of view, Battir is located on latitude of 35° 8′ and a longitude of 31° 44′ (Palestinian Central Bureau of Statistics, 2003). The village has about 5000 inhabitants living in about 750 houses distributed all over the village land boundary of approximately 8000 dunums size, of this area, about 3500 dunums (Palestinian Central Bureau of Statistics, 2003)is nowadays beyond the armistic line of 1967 (map 1).



Picture 1: Stonewall terraces that are distinctive physical feature of Battir area due to its undulating and steep topography.

From a natural geographic perspective, Battir area belongs to what's called the "the Mountainous Area Region" in general, and in specific belongs to the Central Palestinian Mountains area. Cold Mediterranean Climate is prevailing in Battir area, which is characterized by a mean annual rainfall of 500 to 550 mm and a mean annual temperature of 16 Cº (Isaac *et al.*, 2005; Palestinian Central Bureau of Statistics, 2004).
Generally speaking, Battir has two major soil types, these are the terra rosa and the rendzina soils (Dan *et al.*, 1976; Ministry of Planning and International Cooperation - MOPIC, 1998; Ministry of Planning and International Cooperation -MOPIC, 1998; The Applied Research Institute of Jerusalem -ARIJ, 1995), but the main soil type in the area is belonging to the terra rosa (Picture 2).

Picture 2: Major soil type (terra rosa to the left and brown rendzina to the right) in Battir area.

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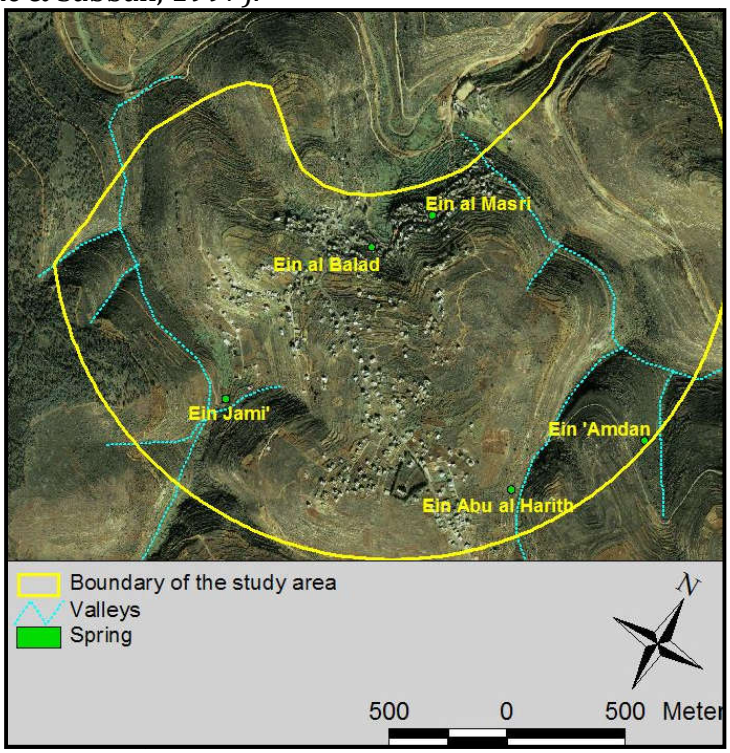
From a geologic point of view, the area has dolomite, lime stone, chalk and marl rocks that are dated to the Cinomanian and Toronian periods (Abed, 1999). These geological formations are known of their good characteristics to retain and store water inside.
The main water source in Battir area depends on springs for both irrigation and for domestic use. Currently people reduced using the spring water for their own needs; rather they are using piped water where all houses are connected to public water network.
Five springs exist into different parts of Battir area (Map 2), these are:

a. 'Ein al Balad: it is one of the two main spring in Battir upon which heavy agricultural activities (i.e. vegetables' irrigation) rely. The spring is located in the northern side of the village and adjacent to the center of the populated area.This spring is fameous of its water collection pool dated to the Roman time (Lieut & Conder, 1881; Tmeizeh, 2000). This spring has the highest discharge rate among other exisitng springs (Picture 3).
b. 'Ein Jami': The rocks in this spring is hard lime stone with shallower cracks into the rocks' layer. This has resulted in a lower discharge than 'Ein al Balad due to both harder rock layers and lower cracks (Abed, 1999; Tmeizeh, 2000). Similarly, this spring is accompanied with a collection pool that is dated to the Roman time (Picture 4).
c. 'Ein Al Masri, 'Ein Abu al Harith, 'Ein 'Amdan: These are small springs that are mainly used for domestic purposes (Ministry of Planning and International Cooperation -MOPIC, 1999).

As mentioned before, these springs enable the intensive irrigated agriculture on the sloppy terraced land of Battir. The springs' water is though considered as the main source of drinking water for both domestic animals as well as for wildlife (Ar Rabi & Tamimi, 1998; Isac & Sabbah, 1997).



Map 2: Spatial distribution of springs in Battir area.

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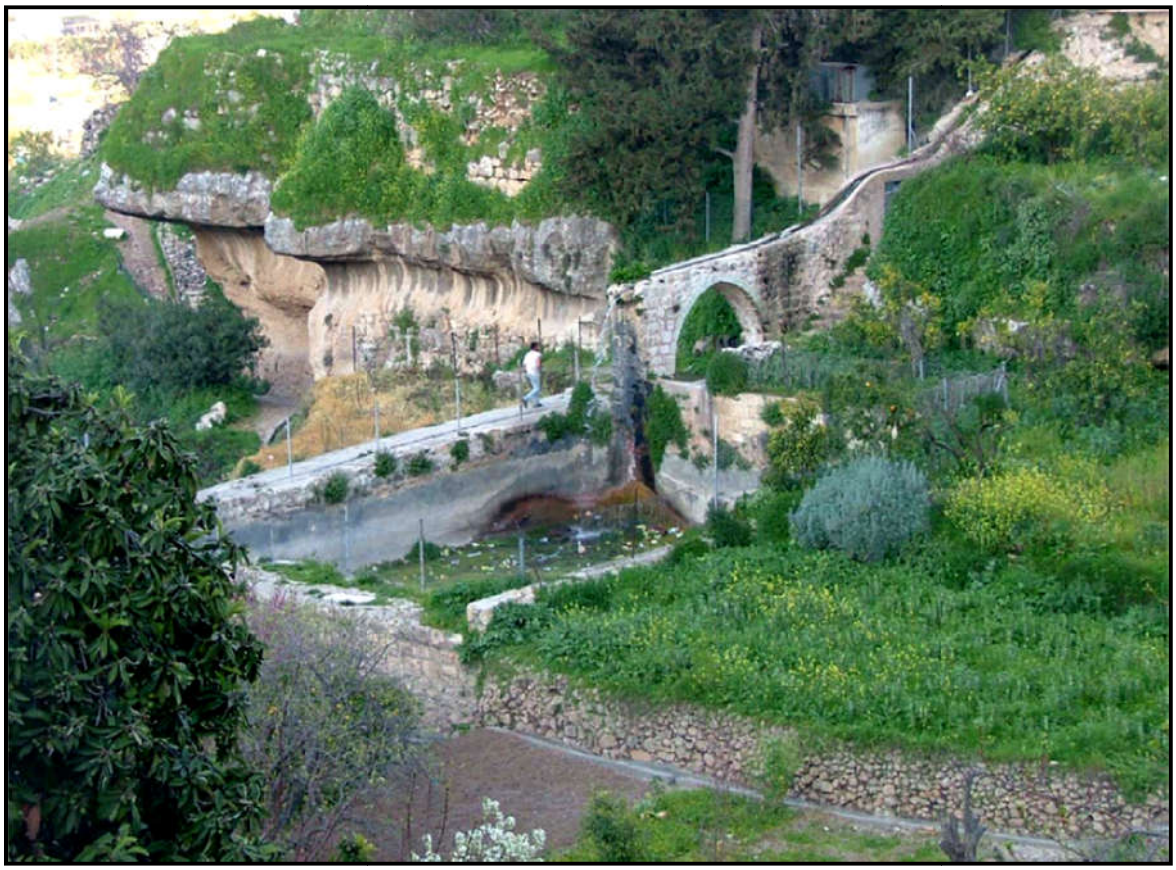

Picture 3: 'Ein al Bald spring with the surrounding irrigated terraces.

With respect to the ground water resources, Battir area has deep underground aquifer system that originates from the Upper Cenomanian age, consisting mainly from limestone, chalk and dolomite (Abed, 1999; Tmeizeh, 2000). The ground water is deep in this area and generally it is located more than 100 meters beneath the ground surface.

Due to the fertile soil, dens forested areas occupied mainly by pine trees and some other native plants and shrubs, and the presence of water in the springs, Battir area witnessed a diversification of its natural habitat, both flora and fauna.

Among the common flora that can be registered in the area are (Isaac, Halayqa, Hilal, Qubaja, El-Butmah, & Jubran, 2005; Ministry of Planning and International Cooperation - MOPIC, 2000) *Pinus halepensis, Quercus calliprinos, Ballota saxatilis, Stachys palaestina, Mentha longifolia, Sternbergia clusiana, Teucrium divaricatum, Dianthus strictus, Marrubium vulgare, Sideritis pullulans, Micromeria nervosa, and Origanum syriacum* (Picture 5).

In addition to the flora, people of Battir witnessed the presence of a variety of wild animal such as Mountain Gazelles, Hyenas, Wolfs, Palestinian mole rats, and the Red foxes. These wild animals usually come from the surrounding areas to drink water from existing springs (Ministry of Planning and International Cooperation -MOPIC, 1999; Ministry of Planning and International Cooperation -MOPIC, 2000).

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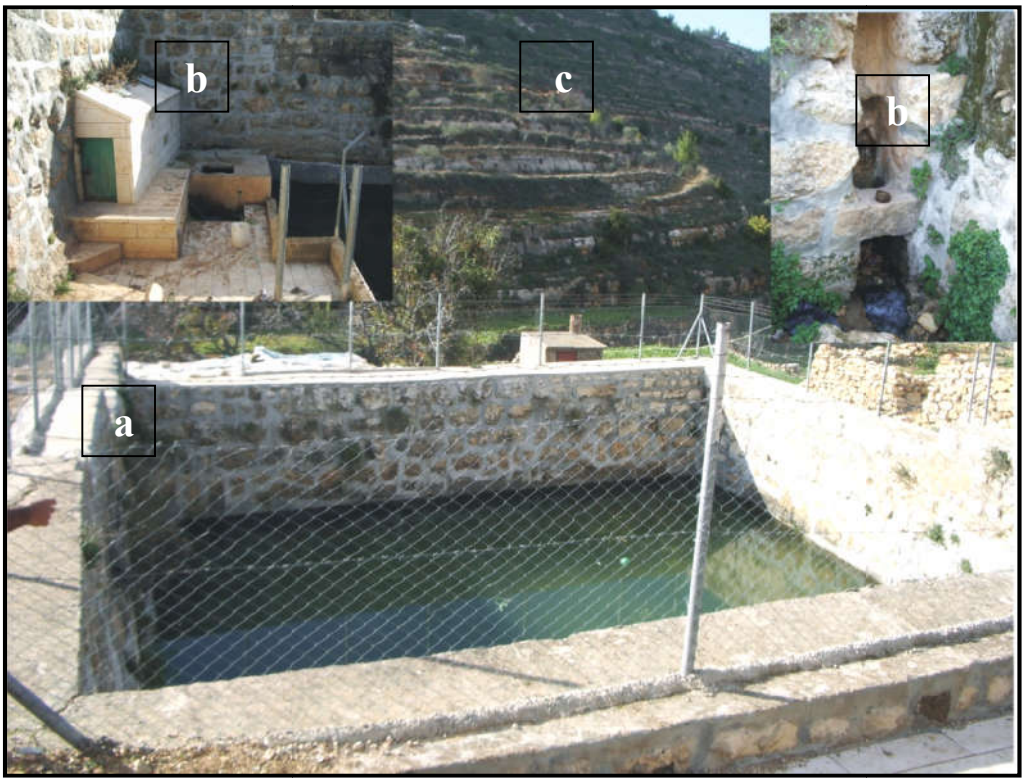
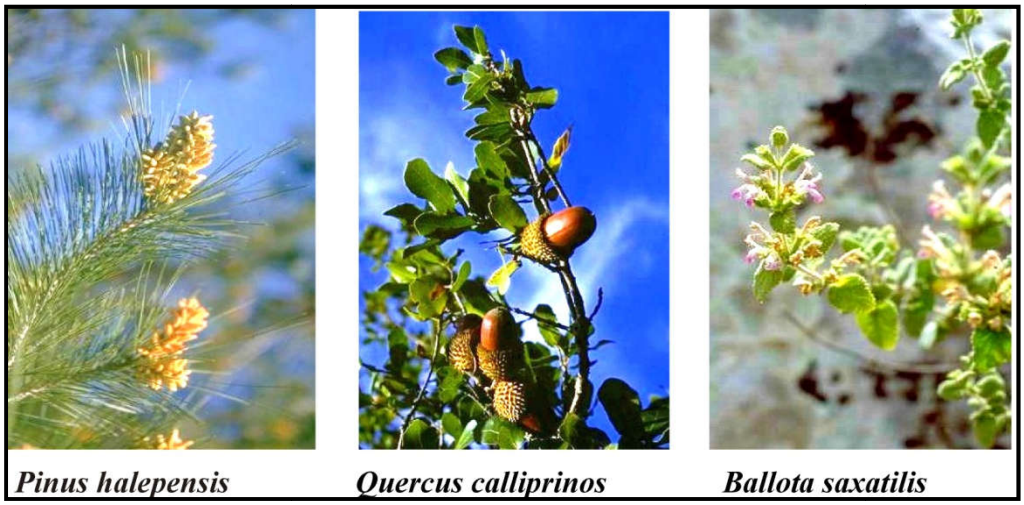


Picture 4: 'Ein Jami' spring and its collection pool (a), water delivery system (b), and the surrounding terraces (c).



Picture 5: Some indigenous wild plants in Battir area.

3.2. LANDSCAPE QUALITY

An assessment of the landscape quality was also done, which includes objective and subjective judgments. Objective analysis of the landscape elements (Klopatek & Gardner, 2012; Ministry of Planning and International Cooperation -MOPIC, 1998)included the following elements:

a. Landscape as a resource: this indicates the regional or national importance of the landscape as a rare resource or representative resource of other similar areas.
b. Scenic quality: the landscape should have a pleasant and scenic pattern concerning its aesthetic factors.
c. Consensus: there should be a common agreement between the opinions of the landscape inhabitants and the professional ones on landscape importance either artistically, historically, and literature symbolism.
d. Sense of the landscape: the landscape should acquire unique and distinctive characteristics such as special topography, strong sense of the landscape and sense of visual unit of the landscape as a whole.
e. None spoilt character: the landscape should not be messed up by large-scale visual harmful and inharmonious development such as industry, quarries, high-rise buildings, etc.
f. Conservation interests: the landscape should have, in addition to the aesthetic and scenic characters, important historical, cultural, natural habitats and wildlife as well as architectural features.

The objective analysis of the positive landscape elements such as landscape quality, vegetation, topography, water resources, and human induced land use was taken into consideration. Points were awarded to landscape that has positive elements or what is called '' attractors'', whereas points were deducted whenever the landscape contains negative elements or what is called '' detractors'' such as quarries, energy power lines, large industrial areas.

The subjective analysis of the landscape was based on field visits, spot image analysis and interpretation, ground surface photographs and old maps of the area. These tools were used as a mean to check the assessment of the landscape area.

The landscape study area were divided into four main parts according to the direction and other geomorphologic characteristics; the Northern part, the Southern part, the Eastern part, and the Western part (Map 3).

Each part of the landscape was evaluated using the aforementioned landscape elements and in both way; objectively and subjectively (Ministry of Planning and International Cooperation -MOPIC, 1999). In addition, each element of the landscape was either exists in each part or does not exist. The total sum of the existing positive landscape elements was then calculated as the total sum of attractors. Additionally, the total sum of negative elements in each part of the landscape was also calculated as the total sum of detractors. The final rank of each part of the landscape is then calculated as the difference between the total sum of attractors and the total sum of detractors. The results of the evaluation are shown in Table 1.

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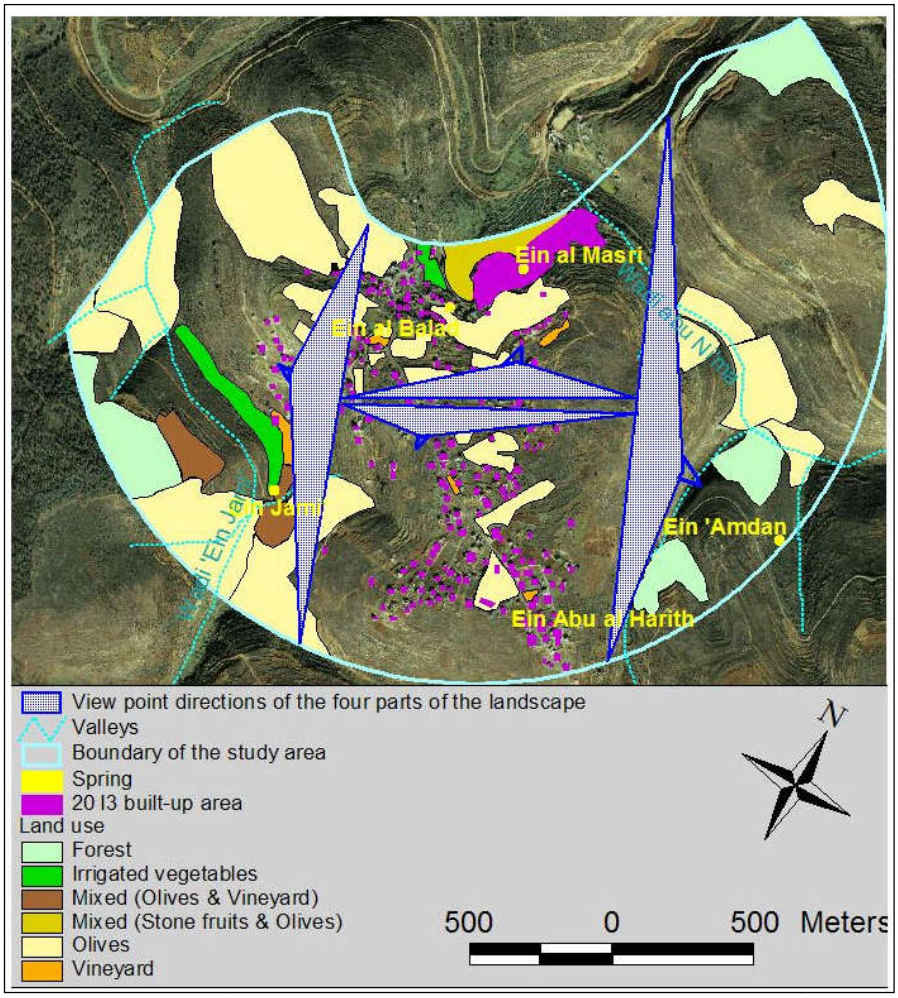

Map 3: Viewpoint directions for the evaluation of different landscape elements in Battir area.

Table 1: Final evaluation of the landscape in Battir according to objective criteria.

Landscape qualities	**Eastern part**	**Western part**	**Northern part**	**Southern part**
Landscape attractors				
1. Topography and geomorphology				
Valley/s floor	√	√		
Terraced mountain side/s		√	√	√
Plain/s	√	√	√	
Plateau		√		√
Non-terraced mountain side/s	√	√	√	√
Sea cost				
Rift area				
Coastal area				
2. Biodiversity and natural habitat				
Forests	√	√		

Shrubs	√	√	√	√
Flora	√	√	√	√
Fauna	√	√	√	
Nature reserves				
Parks and recreational area		√	√	
3. Water				
Springs	√	√	√	
Valley/s	√	√		
River/s				
Pool/s & pond/s		√	√	
Lake				
Fall				
Canals (irrigation)		√	√	
4. Aesthetic factors				
Balance	√	√	√	√
Scale	√	√	√	√
Enclosure	√	√	√	√
Texture	√	√	√	√
Color	√	√	√	√
Diversity	√	√	√	√
Unity	√	√	√	√
Form	√	√	√	√
5. Consensus & conservation				
Artistic		√	√	
Historic and cultural		√	√	
Literature		√	√	
6. Agro biodiversity				
Olives	√	√	√	√
Vineyards		√	√	√
Fruit trees				
Citrus				
Field crops	√			
Palms				
Banana				
Vegetables		√	√	
7. History and archeology				
Number of exisitng sites	√	√√	√	√
Site age value	√√	√√	√	√√
TOTAL ATTRACTORS	**22**	**32**	**26**	**18**
Landscape detractors				
Urban expansion		√	√	√
Roads	√	√	√	√
Quarries				
Industry				
Solid waste disposal site	√			√
TOTAL DETRACTORS	**2**	**2**	**2**	**3**

FINAL TOTAL RANK	**20**	**30**	**24**	**15**

Analysis of the total attractors and total detractors for each part of the landscape revealed that the western part of the landscape areas acquires the highest total positive ranking. This means that this part is the most valuable area in the landscape that should be included in any future conservation and protection. The northern part of the landscape comes second in total ranking, which means that this part has high potential for conservation and as a cultural landscape area. Generally speaking, both parts (western and northern) have acquires the following important characteristics that qualify them for, at least, national and regional importance:

a. The diversity of their natural habitat and species.
b. The presence of historical, cultural, and artistic symbols related to both parts.
c. The high aesthetic values that exist in both parts, which are clear from the diversity of the colors, texture, landscape elements and the land forms settings in both parts.
d. The existing potential with regard to land use that resembles traditional and historical characteristics of the inhabitants in the area.
e. The prevailing water structures, water distribution, terraces and water delivery systems that constitute important part of the history and tradition that was and still in use. Taking these into accounts, many changes can be noticed on the cultural landscapes which are noticed by the previous travelers and exploration records. Most of these records agree on describing the terraces and the pools of Battir. These are major stable elements that remained for centuries.
f. Other cultural and historical elements and features which constitute economic and / or religious values. For examples, the two *Maqams* and the terraces and the pools. The terraces are of a special notice.

4. CONCLUSIONS AND RECOMMENDATIONS

From the previous description, the main conclusions that can be drawn out are the following:

1. Only certain parts of the studied area are valuable with regard to the cultural and natural landscape settings; these are the eastern and the northern parts. The two parts have a diversity of cultural and natural elements that qualify both parts to be important both on the national as well as the regional scale.
2. In general, the whole landscape area is currently being subjected to drastic and quick development. This development is the resultant of the high population growth rate, and the associated services and infrastructure expansion.
3. The area has been subjected, during the last 70 years, to a quick and large urban expansion, which has resulted in the disappearance of certain important cultural practices (i.e. vineyards' cultivation, open surface canals irrigation and the traditional way adopted for water allocation and distribution among the inhabitants of the area).

4. Careful landscape planning is required to protect the area from existing threats. This is to attain sound and sustainable use of the resources in the area.
5. Planning should be accompanied with laws, bylaws and regulation so as to monitor and prevent the current destruction of the existing cultural and natural elements of the area (i.e. archeological thefts, terraces ignorance and destruction, the rapid change of the traditional agricultural area to built-up areas).
6. Furthermore, the description of the Survey of Western Palestine can be used to note those aspects of the cultural landscape that had changed. In the general sense, the modern activities have caused many cultural elements that have been described previously to disappear.
7. However, local awareness with the intension of rebuilding certain elements of the landscape should be guided by professional teams. For example, renewing the terrace systems and the renovations of the old pools.
8. Preservation of ancient remains, which are represented by different Khirbeh and other ancient sites.
9. The problem of archeological plundering, which is being heavily practiced in the area, similar to other areas, should be dealt with immediately.
10. Future management plan, which may include excavations and preservations of the archeological and historical sites, should present the site value in a critical approach that connects the value of the site to Battir cultural history.
11. On the other hand, neglect of agricultural terraces, historical pools and traditional architecture, and the associated shift from traditional cultivations to nontraditional activities is a witnessed phenomenon that may cause the disappearance of these traditions and the underlying meanings.
12. There are adverse and negative environmental effects of the sewage water that is disposed randomly from the surrounding Israeli settlements, which necessitates the immediate interferences to minimize or totally stop these effects. The interferences might be practical and/ or physical ones (i.e. redirecting the effluent into closed pipes from its sources) or it could be legal and juridical ones (negotiating the Israeli to stop this action and getting support from the legal system in Israel).

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